# 2 Blue Springs Lake

## 2.1 General Background

Blue Springs Lake was impounded in 1988, and reached full pool on 18 March 1990. The main threats to the water quality of Blue Springs Lake are nutrients, bacterial contamination, herbicides / pesticides, and other contaminants related to an urban environment. An exotic aquatic plant, Eurasian Milfoil (*Myriophyllum spicatum*), is present in the lake and is a serious concern of Jackson County Parks and Recreation Department (JCPRD). An unsuccessful drawdown was attempted in 2002 to control the plant. Therefore, the JCPRD and the Missouri Department of Conservation (MDC) are considering a two-year chemical treatment with Sonar.

### 2.1.1 Location

A dam located 7.4 km (4.6 miles) upstream on the East Fork of the Little Blue River impounds Blue Springs Lake; the dam is 46 km (28.8 miles) upstream of the Missouri River. The lake is located approximately 24.2 km (15 miles) southeast of downtown Kansas City, in Jackson County, Missouri. Historic water quality sample sites at Blue Springs Lake include 3 lake, 1 outflow, and 0 inflow sites (Figure 2.1).

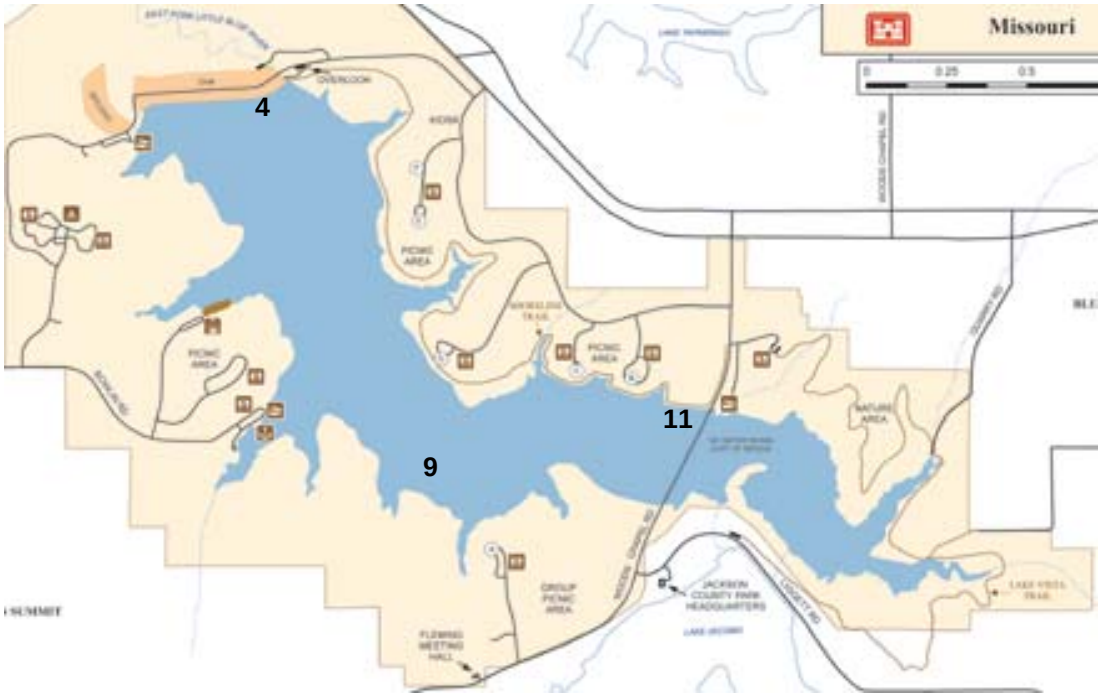



Figure 2.1. Blue Springs Lake area map with sample site locations and numbers.

### 2.1.2 Authorized Purposes:

flood control, recreation, and fish and wildlife conservation, and water quality improvement.

### 2.1.3 Lake and Watershed Data

| Pools | Surface Elevation (ft. above m.s.l.) | Current Capacity (1000 AF) | Surface Area (A) | Shoreline (miles) |
|---|---|---|---|---|
| Flood Control | 820.3 | 15.8 | 982 | |
| Multipurpose | 802.0 | 10.8 | 722 | 12 |
| Total | | 26.6 | | |

Total watershed area: 32.8 sq. miles (20,992 A)
Watershed ratio: 21.38 flood control (FC) / 29.07 multipurpose (MP)

Average Annual Inflow: 26,373 acre-ft (1989 – 2004)
Average Annual outflow: ? acre-ft
Sediment inflow (estimated): 3 acre-ft/yr

### 2.2 2005 Activities

Blue Springs Lake was categorized as an 'ambient' lake during 2005, thus only surface samples were collected at the three lake sites. Samples were collected from May through September; no samples were collected in August due to schedule conflicts. Todd Gemeinhardt (MDC) provided field assistance and a boat at Blue Springs Lake during 2005. Fecal bacteria (*Escherichia coli*) samples were collected weekly at the swimming beach from April through September by JCPRD.

### 2.3 2005 Data

Comparative historic data is limited to single samples from 1999 and 2002 and three samples from 2004. Samples were collected from May through July and September 2005.

#### 2.3.1 Inflow

There is no inflow sample site at Blue Springs Lake because Lake Jacomo dam is immediately above the lake.

#### 2.3.2 Lake

In regards to nutrients, total nitrogen (TN) concentrations from surface samples are relatively consistent between all three lake sites, with median values of samples collected between 1999 and 2005 ranging from 0.77 – 0.82 mg/L (Figure 2.2). Although all samples exceed the proposed EPA nutrient criteria value of 0.36 mg/L total nitrogen, these are some of the lowest median values within the district. Total phosphorus (TP) concentrations are low compared to the other district lakes, with median values ranging from 0.04 – 0.06 mg/L (Figure 2.3). All values exceed EPA's proposed nutrient criteria value of 0.02 mg/L. The exotic milfoil most likely serves as a nutrient sink for phosphorus within the lake. Therefore, lower TP concentrations would be expected.

Median chlorophyll a values ranged from 19.7 – 25.7 ug/L, which is indicative of eutrophic waters (Figure 2.4). These values were highly variable between months and sample sites, with the upper lake site being most stable. As expected, median secchi depth was significantly less at the shallow upper site when compared to the other two deep sites (Figure 2.5).

Vertical profiles were recorded during the monthly sampling trips. Parameters included temperature, dissolved oxygen, pH, conductivity, and turbidity. Typical of smaller, eutrophic reservoirs in Missouri, the lake was strongly stratified both thermally as well as chemically between 3 – 4 m during June and July (Figure 2.6). Fall mixing was evident during the September sample as water temperatures were nearly uniform from top to bottom, while chemical stratification (dissolved oxygen) remained only in the bottom 2 m.

Weekly samples (April – September) of fecal bacteria collected during 2004 and 2005 are presented in Figure 2.7. The fecal bacteria samples exceeded the state standard for whole-body contact on three occasions – twice in June and once in August -- during 2005.

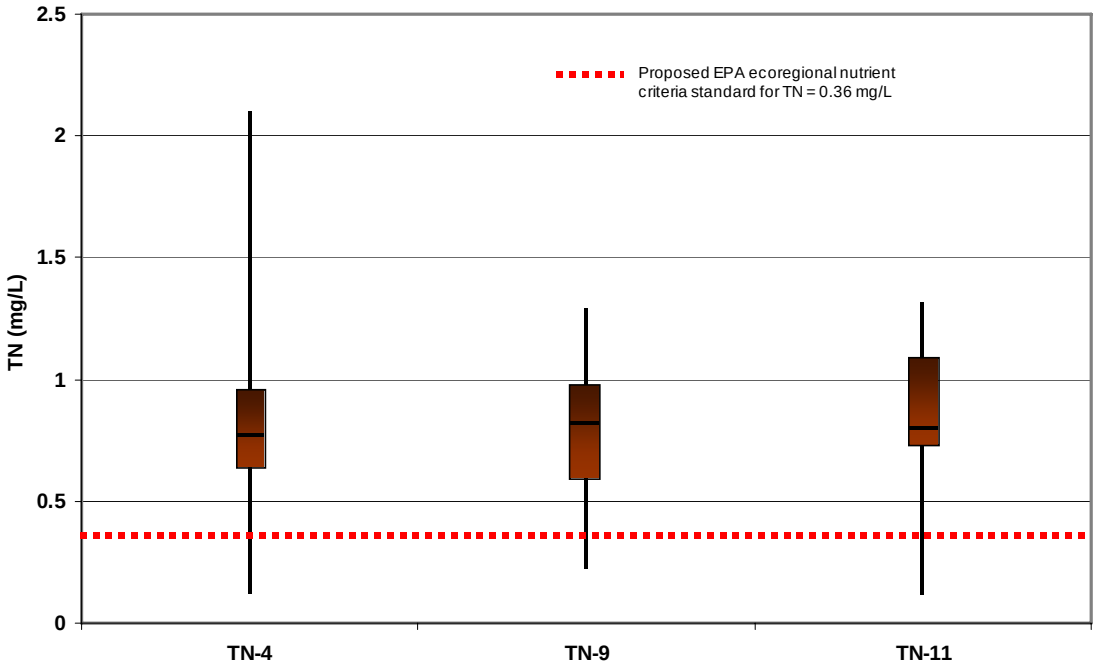



Figure 2.2. Box plots of surface water sample total nitrogen concentrations measured at lake sites from 1999 through 2005 at Blue Springs Lake.

### 2.3.3 Outflow

No outflow samples were collected from Blue Springs Lake during 2005.

## 2.4 Future Activities and Recommendations

Sampling activities for 2006 include continuation of monthly 'ambient' monitoring and profiles at each of the three lake sites from May through September. Bacteria sampling at the beach will continue on a weekly basis during the summer by JCPRD. Due to the urban setting of this lake, sediment contaminant analyses should be conducted in the

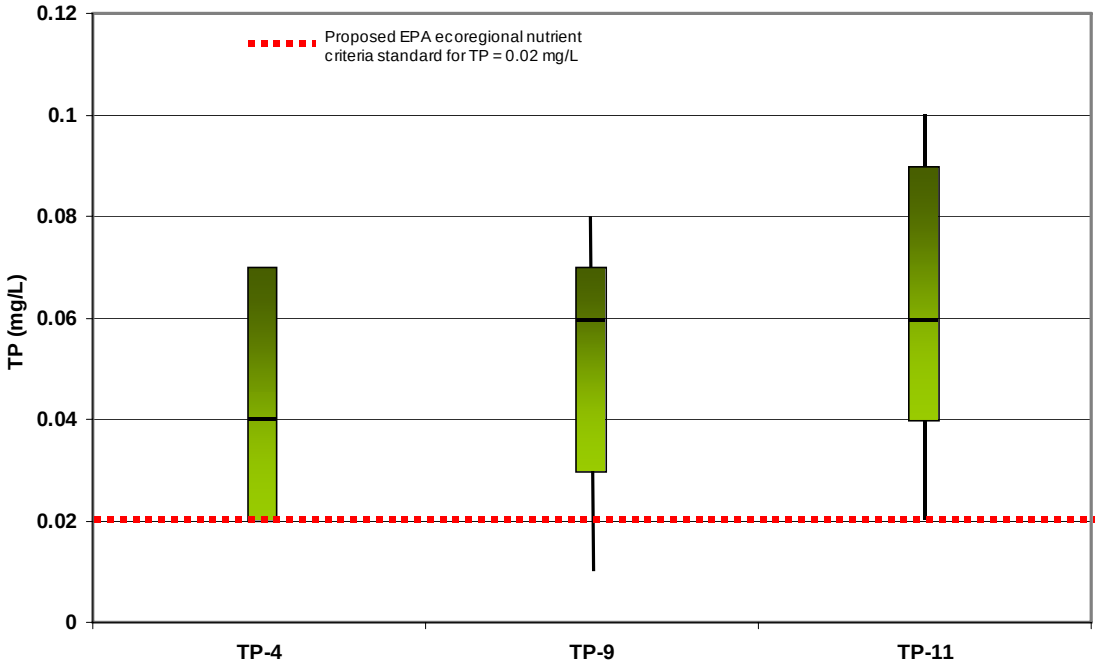



Figure 2.3. Box plots of surface water sample total phosphorus concentrations measured at lake sites from 1999 through 2005 at Blue Springs Lake.

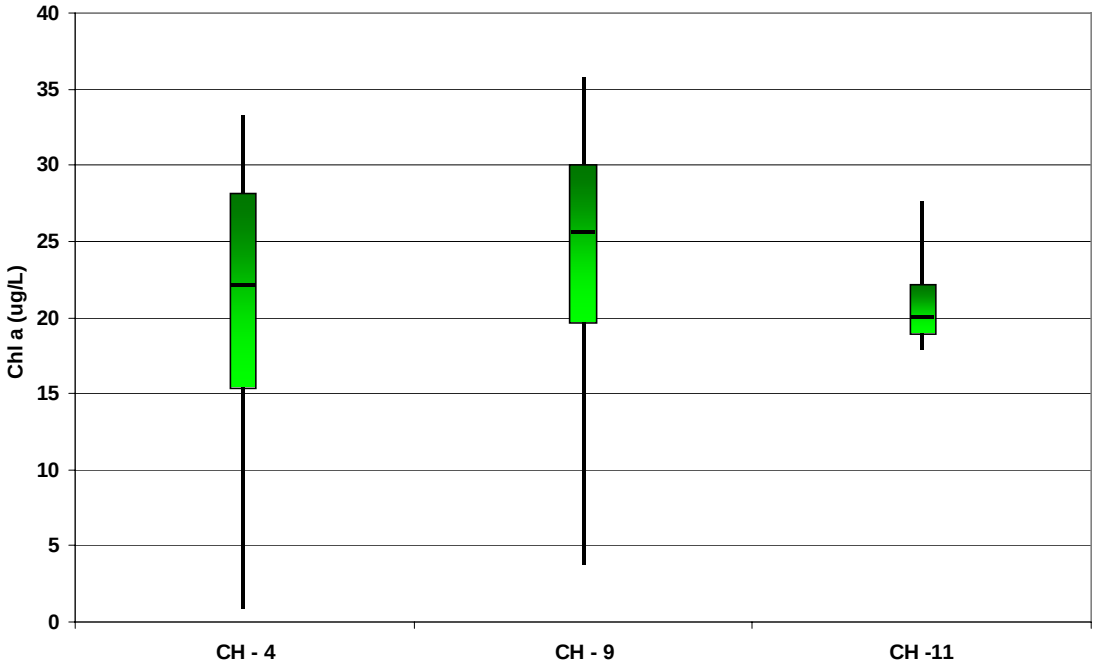



Figure 2.4. Box plots of chlorophyll a concentrations measured at lake sites from 1999 through 2005 at Blue Springs Lake.

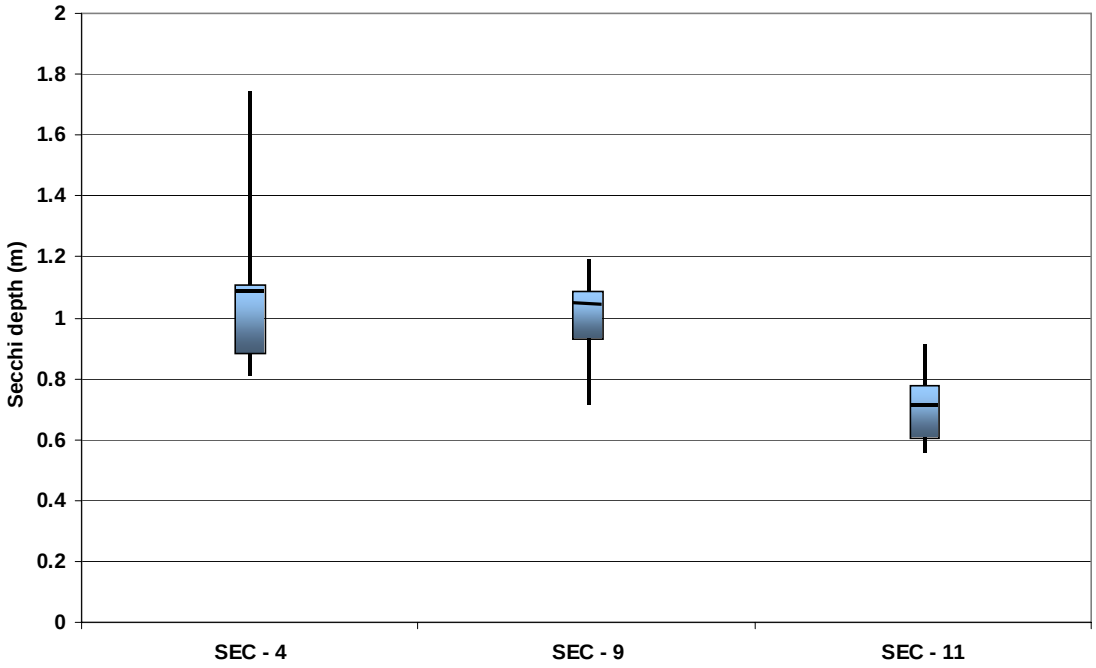
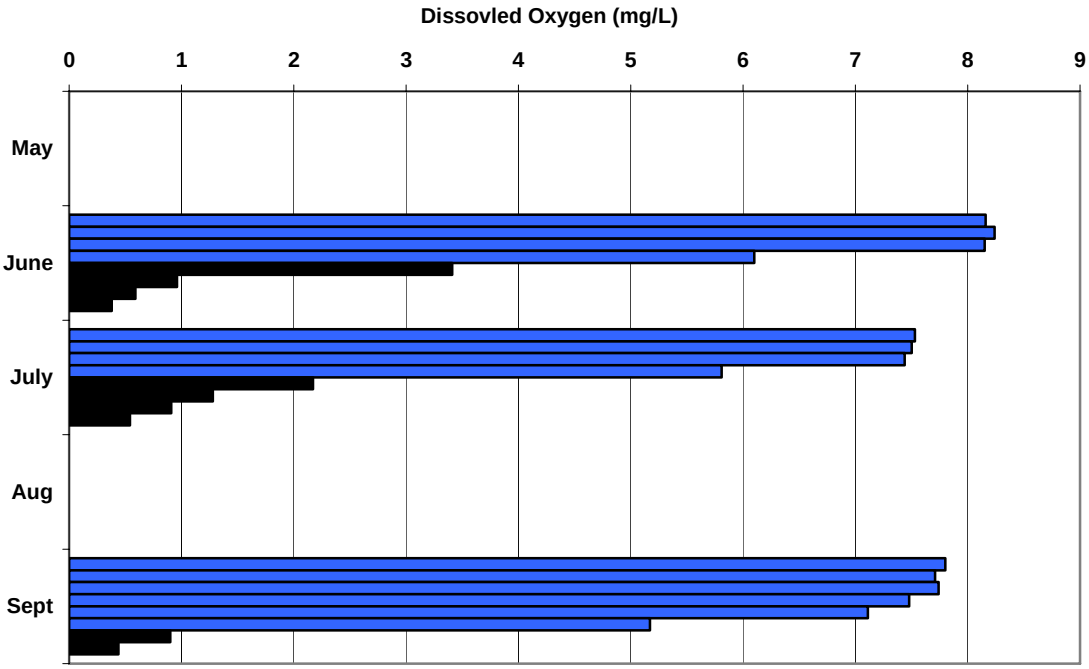



Figure 2.5. Box plots of secchi depth measurements measured at lake sites from 1999 through 2005 at Blue Springs Lake.



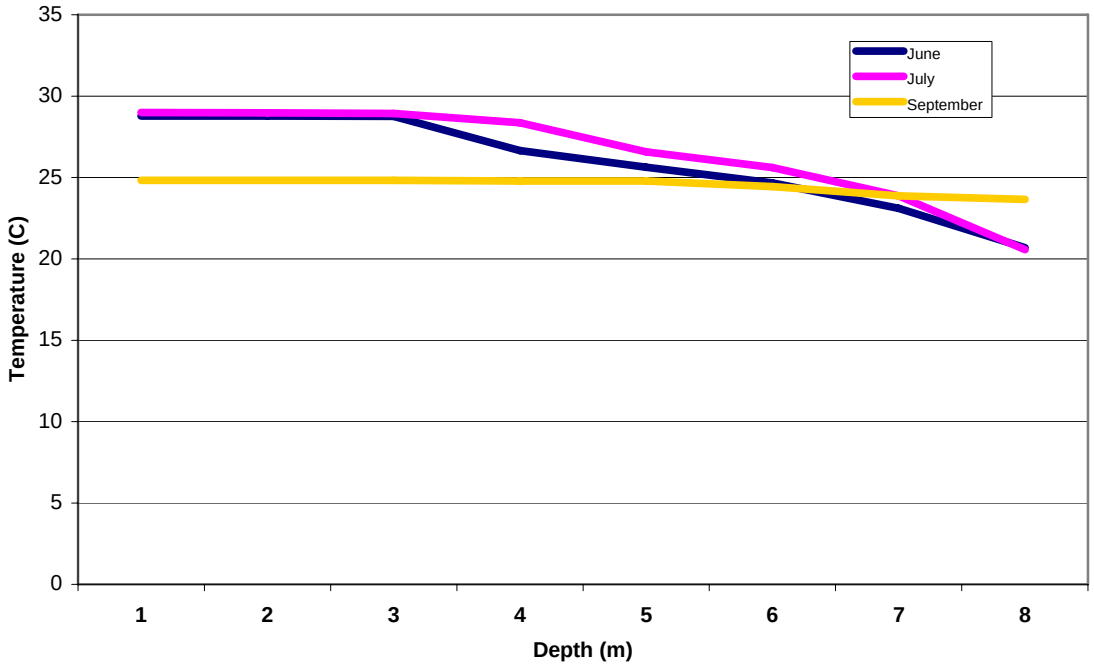



Figure 2.6. Dissolved oxygen concentration (mg/L) histogram and temperature (C) plots from vertical profiles recorded at Site 4 during June, July and September, 2005 at Blue Springs Lake.

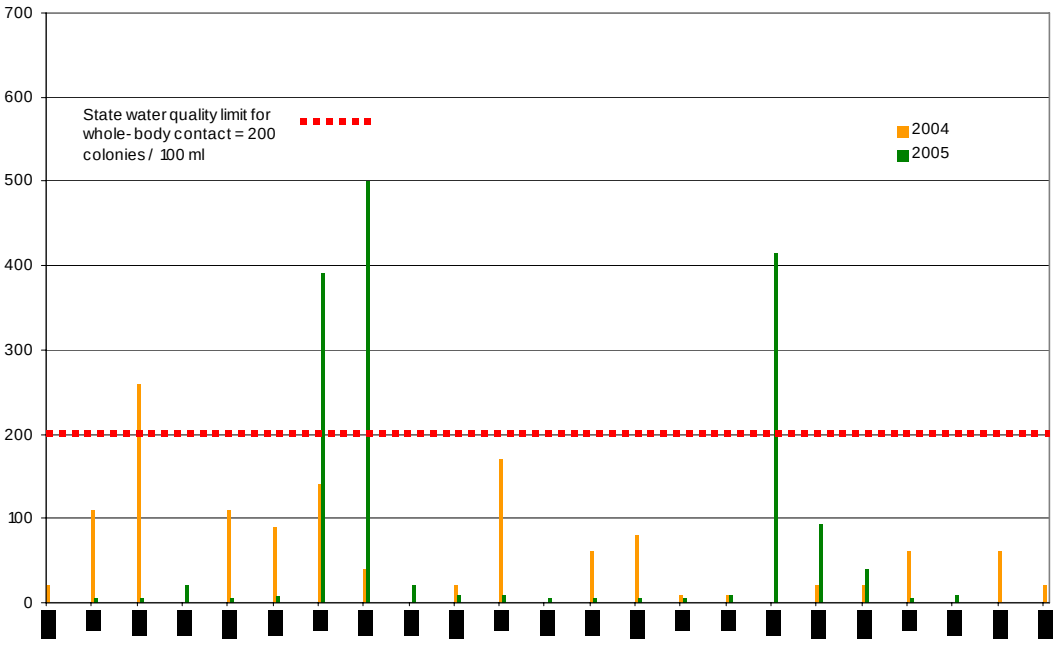



Figure 2.7. Fecal bacteria (E coli) colonies per 100 ml samples collected at the swimming beach from April through September during 2004 and 2005 at Blue Springs Lake.

future to provide status and trend information. Will discuss with both MDNR and MDC about developing a watershed organization, which could include upstream reservoirs (Prairie Lee and Jacomo). Other partners could include Missouri Department of Natural Resources (MDNR), JCPRD, and NWK. Aquatic vegetation control efforts are important to overall lake water quality, as this undesirable plant does serve as a nutrient sink. A contaminant of interest for future sampling are polyaromatic hydrocarbons (PAHs). These compounds are components of asphalt, fuels, oils, and greases.